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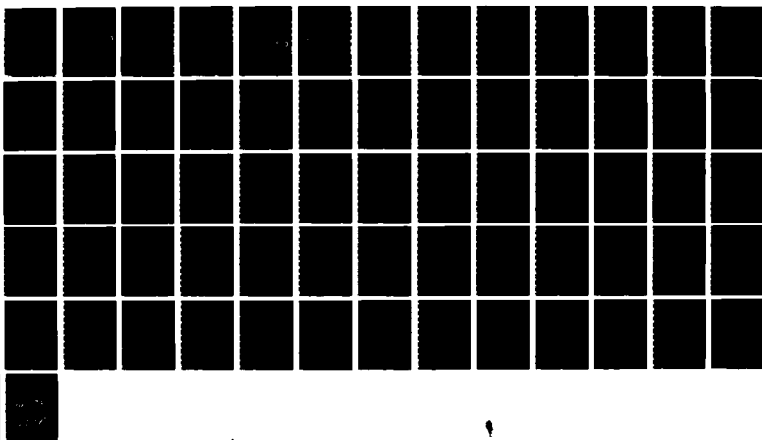
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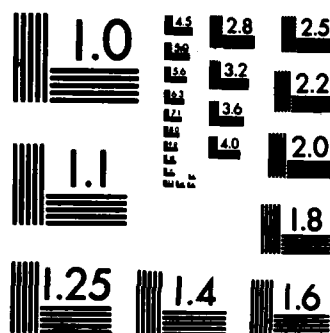
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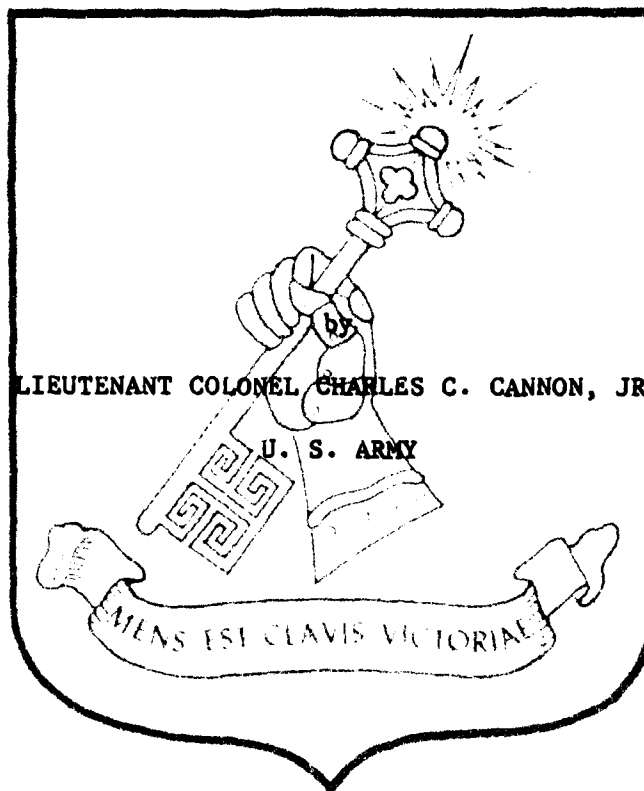


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COMBAT SERVICE SUPPORT OF AIRLAND BATTLE DOCTRINE



LIEUTENANT COLONEL CHARLES C. CANNON, JR.

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The author concludes that the current sustainment system fails in many aspects to meet the requirements of the doctrine. Some of the differences between doctrinal requirements and current capabilities are unique to specific logistics functional areas but most cut across multi-functions, indicating the need for an integrated total sustainment system review. To develop a balanced system, one balanced among the various logistics functions and within the total combined arms force and capable of executing the doctrine. In the final analysis, this paper seeks to increase awareness and encourage critical thought about the current doctrine and sustainment system.

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ABSTRACT

Combat Service Support Of AirLand Battle Doctrine by
LTC Charles C. Cannon, Jr., USA, 62 pages

AirLand Battle is the U.S. Army's doctrine for fighting the next mid to high intensity conflict. To be successful the doctrine requires a homogenous combined arms force specifically organized, equipped, and trained to execute its maneuver style of warfare. Each component, combat, combat support, and combat service support must be an equal contributor to total force balance and homogeneity. This paper looks at ~~one of these components~~, the combat service support system, to determine if it is an enhancement to the success of the Army's basic maneuver unit, the heavy division. The battlefield environment, doctrinal tenets (synchronization, agility, depth, and initiative) and sustainment imperatives (anticipation, integration, continuity, responsiveness, and improvisation) are examined to determine the requirements they place on the combat service support system. These requirements are used as the basis of analysis of the current system by functional area (supply, maintenance, medical, transportation and services).

The author concludes that the current sustainment system fails in many aspects to meet the requirements of the doctrine. Some of the differences between doctrinal requirements and current capabilities are unique to specific logistics functional areas but most cut across multi²functions, indicating the need for an integrated total sustainment system review. To develop a balanced system, one balanced among the various logistics functions and within the total combined arms force and capable of executing the doctrine. In the final analysis, this paper seeks to increase awareness and encourage critical thought about the current doctrine and sustainment system.

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INTRODUCTION

The ultimate aim of logisticians throughout the annals of war has been to provide the right combination of combat, combat support and combat service support forces to the right location at the decisive time, properly equipped to fight, and with the means to sustain them through mission accomplishment. The great battle captains of history have found this to be an elusive goal. Napoleon reportedly described the importance of what today we call combat service support in the success of operations:

The more I see of war, the more I realize how it all depends on administration and transportation. . . . It takes little skill or imagination to see where you would like your army to be and when, it takes much knowledge and hard work to know where you can place your forces and whether you can maintain them there. A real knowledge of supply and movement factors must be the basis of every leader's plan; only then can he know how and when to take risks with those factors, and battles are won only by taking risks.¹

One may argue that the characteristics of the dynamic AirLand battlefield make the Emperors' comments about knowing where, when, and how to employ forces not nearly so simple a task today. However, it is fair to say that combat service support remains an important, if not decisive, factor in maneuver forces achieving operational success. The future battlefields will pose greater challenges, not only for the combat forces that fight on them, but also for the combat service support units that provide the sustainment. Resources will be austere and maneuver forces will have to take full advantage of those available. For this to be possible, combat service support planners and operators have to possess the same qualities as combat leaders; and they must work together as an integrated team to ensure that the tactical plan is

supportable. While it is true that combat service support cannot win the wars, it is also true that if it is not an integral part of operations, a true combat multiplier for the maneuver force, combat service support will spell defeat--as even Napoleon learned on the steppes of Russia.

An important question, then, is whether or not the United States Army's support system is an enhancement to maneuver force success on the AirLand battlefield. This paper will consider this question by first looking at the AirLand battlefield environment and doctrine that shape the demands placed on the combat service support system, then looking at current combat service support capabilities. To provide focus we will restrict our attention to the present basic army maneuver unit, the division, specifically the heavy division, and the combat service support systems available to support it.

AIRLAND BATTLEFIELD ENVIRONMENT

Virtually all military analysts agree that the next high to mid intensity war will be unprecedented in its lethality, swiftness, and complexity. Field Manual 100-5, Operations, envisions a multidimensional battlefield of much greater depth and breadth than previously experienced. This will result from increased ranges of weapons, mobility of units, and enhanced capabilities in communications, long range targeting, and intelligence acquisition.

Operations will be multidimensional and continuous. Concurrent with large unit conventional operations there will be acts of terrorism, unconventional warfare, and most probably some combination of nuclear, biological, and chemical operations conducted. The use of air mobility will rapidly maneuver combat power anywhere on the battlefield. Engagements will occur

simultaneously throughout the depth of the battle area, both forward and rear of the forward line of own troops (FLOT). Commanders at each level will be confronted with the requirement simultaneously to synchronize their forces fighting the deep, close, and rear battle into a coherent whole. This battle will be fought on a fluid nonlinear battlefield where rapid movement on both sides will cause units to bypass or get bypassed and be required to fight isolated for periods of time. The characteristics of this environment dictate that while communication and support will be vital, they in fact will be austere as both can and will be interdicted.

Difficult terrain, particularly mountainous, jungle, and urban, will take on greater significance by limiting the line of sight necessary to gain the maximum effectiveness from today's longer range weapons. It will restrict movement of the more mobile weapons systems, and limit communications and target acquisition. Lethal systems in large quantities will concentrate vast combat power at points of choice causing a constant cycle of massing maneuver forces at decisive points followed by dispersal for force preservation.

The very nature of this battlefield will force austere logistical support. Consumption of all supplies, especially fuel, ammunition, repair parts, and major systems, will be high. Lines of communications will be vulnerable and inevitably interdicted as will support facilities, thus disrupting normal sustainment of maneuver forces. All this indicates that the tide of battle could decisively change in minutes, and units must be prepared to deal with the unexpected and to fight independently at any given time.

The Soviets agree that such a war could be measured in terms of days rather than weeks or months and could consequently place great emphasis on the initial engagements and the speed with which the offensive could be concluded.

In fact, they emphasize the decisiveness of speed saying, "One minute decides the success of battle, one hour the success of a campaign, and one day the fate of the war."²

Such warfare will require mentally quick commanders and physically quick forces. It will require units that are equipped and organized into a combined arms maneuver force capable of executing a doctrine designed specifically to meet the condition of fluid operations. This force must be capable of independent operation and self-sufficiency for extended periods of time while conducting offensive or defensive operations, or possibly both simultaneously, throughout the depth of the battle area. All elements of this maneuver force, combat, combat support, and combat service support require equal degrees of mobility as the least mobile will determine total maneuver force agility and ultimately its success or failure.

AIRLAND BATTLE DOCTRINE

The natural question that follows this brief description of the AirLand battlefield is how do we prepare to fight and win the battles to be fought on it? FM 100-5 provides that answer in the form of AirLand Battle doctrine.

The US Army's basic fighting doctrine is called AirLand Battle. It reflects the structure of modern warfare, the dynamics of combat power, and the application of the classical principles of war to contemporary battlefield requirements. It is called AirLand Battle in recognition of the inherently three-dimensional nature of modern warfare.³

While the tactics it prescribes are not new to the history of warfare, they do represent some divergence from the way we have perceived our tactical and operational methods of fighting. In contrast to its predecessor Active Defense, AirLand Battle doctrine balances offense and defense, maneuver and firepower. It focuses on initiative and aggressive action to defeat the enemy, and details the way to win engagements, battles and campaigns through the application of warfighting principles and tenets. However, it is the tenets of initiative, depth, synchronization, and agility that capture the essence of the AirLand Battle doctrinal philosophy. Accordingly, it is these tenets that should dictate how we organize, equip, support, and train to fight in this environment. To understand the doctrine and its demands on the sustainment system we need to examine them.

"Initiative means setting or changing the terms of battle by action. It implies an offensive spirit in the conduct of all operations."⁴ FM 100-5 differentiates between two types of initiative, individual and operational. Both require a thorough understanding of the higher commander's intent and a willingness to take risks on the part of the commander and subordinate. For operations initiative implies a constant effort to force the enemy to react in a way of our choosing, and in the process unhinge his operational and organizational coherence--a proactive as opposed to a reactive approach to the conduct of operations. Applied to individual leaders initiative means acting independently within the context of the mission to exploit opportunities--exercising decentralized command authority or Auftragstaktik.⁵ However, in application to the battlefield the two forms of initiative are inextricable. At the speed of modern combat, individual initiative is a prerequisite to operational initiative, particularly at the tactical level.

In the defense, initiative means rapidly taking the advantage from the enemy by disrupting his plan and frustrating his efforts to adjust, thereby causing him to lose control of the battle. In the offense, it means setting the terms of battle and never allowing the enemy to recover from the initial shock or gain the ability to dictate the course of events. Initiative is maintained by attacking weak points, flexibly changing the main effort, and rapidly shifting to exploitation or pursuit. The goal of initiative is to create a fluid situation that disrupts the enemy's plan, disorganizes his forces, causes him to lose control and ultimately brings about his defeat. To achieve these conditions on the battlefield requires a responsive decision-making cycle and the advantage in total force agility necessary to execute more rapidly than the enemy can adjust.

For the sustainment system initiative demands mentally agile leaders capable of developing innovative solutions or plans, and physically agile units capable of rapidly adapting to the unexpected. It presupposes that individuals and units are skilled in their trade and knowledgeable in its application, and connotes a willingness and ability on their part to act independently. Within the framework of the commander's intent, the supporters must anticipate requirements (including branches and sequels) and act without waiting to react to demands. As deviation from plans will be routine and risk taking inherent, combat service support planners must know the support requirements of the maneuver force, support capabilities and details of the operational plans, then advise the commanders of the degree of risk. The commander's decision process must include not only the risk of successfully executing the immediate operation, but that of sustaining subsequent operations. For once the initiative is seized the force must be capable of

retaining it. This requires highly mobile, self-sufficient combat service support units that are organized and equipped to provide continuous support. The interrelationship of initiative and agility should be self-evident: for without the ability to shift forces quickly to take advantage of enemy weakness, initiative is lost.

"Depth is the extension of operations in time, space, and resources. Through the use of depth, a commander obtains the necessary space to maneuver effectively; the necessary time to plan, arrange, and execute operations; and the necessary resources to win. Momentum in the attack and elasticity in the defense derive from depth."⁶ It connotes a broad view of the enemy which does not just focus on his point of attack but rather seeks to engage him throughout the depth of his dispositions (flanks, rear, and support echelons) and to disrupt his plans and coordination, thus denying him freedom of action and the initiative. Depth can be achieved through the maintenance, positioning and effective use of reserves to add elasticity in the defense and momentum to the offense, or striking the enemy's rear.

Depth demands that the sustainment system be capable of providing responsive support linearly and horizontally throughout the maneuver force's area of operation. It implies long vulnerable lines of communications, a degree of mobility equal to the supported force and flexibility in tailoring capabilities and positioning support facilities. It also implies a robustness in the combat service support organizations that enables them to deal with rear area threats and continue to provide support. Alternate and redundant channels and procedures should exist for each type of support. If a channel is disrupted, plans should provide for quickly reestablishing the original

channel or rapidly switching to an alternate one. Support means of any one type should not be concentrated but should be as widely dispersed as the operation and the vulnerability to interdiction will permit.

Flexibility allows the combat service support planner to draw resources from one mission in order to meet the requirements of another, providing the ability to adjust the support structure and change missions in a timely manner--allowing support in unexpected situations without sacrificing available resources. Implicit in this flexibility to restructure and reorient the support base are the requisite communications and transportation systems necessary to execute it on the battlefield. Inherent in the effective use of depth is the initiative to react, the agility to take advantage of opportunities and the ability to synchronize combat power at the decisive point and time.

Synchronization is "the of arrangement of battlefield activities in time, space, and purpose to develop maximum combat power at the decisive point. More than just the coordination of actions within the force, synchronization seeks the full exploitation of a force's combat potential."⁷ While related, synchronization is not synonymous with concentration, which connotes the bringing together of actual combined arms activities (forces and fires) at a point in time and space. Synchronization seeks to bring together only the effects of these forces, which themselves maybe separated in time and space, to produce maximum relative combat power. It implies the orchestrating of systems to gain a synergistic effect greater than the sum of individual parts. However, since combat service support can not be projected as can fires, sustainment requires the physical coming together of support and maneuver forces at critical times and locations.

Synchronization requires a sustainment system with the agility to mass quickly, perform its support functions throughout the depth of the battlefield and then disperse to prevent becoming a target. It must begin with planning where combat service support is totally integrated into the concept of operations. Presupposed are self sufficient maneuver units with organic combat service support capabilities and highly mobile support units with a command and control system that allows the coordination and redirection of combat service support assets when and where required. Implied is the necessary redundancy and self protection to perform their support function and survive.

The process of synchronization begins in the mind of the commander, then is translated into the actual planning and coordination of movements, fires, and supporting activities. The product of effective synchronization is economy of force, where every asset is used where and when it will make the greatest contribution as a combat multiplier, and where there is nothing not used or wasted. This requires anticipation and mastery of time-space relationships, an understanding of friendly and enemy capability, and unambiguous unity of purpose throughout the force.

"Agility is the ability of friendly forces to act faster than the enemy, and is the first prerequisite for seizing and holding the initiative. Such greater relative quickness permits the rapid concentration of friendly strength against enemy weakness."⁸ Agility is as much a mental quality as physical. Commanders must have the mental agility to out think the enemy, continuously reading the battlefield, visualizing the actions to take and making rapid decisions (many times with incomplete information). This implies a decision making process which functions faster than the enemy's. However,

prompt decisions by the commander are of no use unless his forces are able to act quickly to exploit his initiatives. This requires physical agility-- forces (combat, combat support, and combat support service) that are organized, equipped into a homogenous whole and with the command and control necessary to react faster than the enemy.

Agility is the tenet that ties the other three together. For without a force that has physical and mental agility a commander will not be able to exploit opportunities to seize or retain the initiative, take advantage of the battlefield depth, nor position forces to allow him to synchronize his combat power at decisive points. In the end, success will depend on the ability to act within the enemy's decision cycle, shifting our combat power to points of our choosing faster than the enemy can react. It is agility that best describes the characteristics required of a successful maneuver force on the AirLand battlefield.

COMBAT SERVICE SUPPORT DOCTRINE

Today the US Army's ability to sustain its operations is more important as an element of combat power than ever before. A unit's flexibility, its ability to maneuver or to mass fires extensively, and its capacity for prolonged operations and operations in depth will all rely heavily on its sustainment system. The differences in firepower, agility, and endurance which can decide battles all derive as much from the combat service support system as they do from any of the other systems that support fighting forces.⁹

While the tenets capture the essence of the doctrine and conceptualize the requirements for the combat service support system, we need to look more specifically and in depth at what doctrinally is required to sustain the maneuver force.

In addition to FM 100-5, combat service support doctrine is articulated in FM 100-10, Combat Service Support (the keystone how-to-support manual) and the implementing 63 series field manuals, Combat Service Support Operations (separate brigade through theater army). However, these support manuals are currently under revision to incorporate the changes in the new FM 100-5. The five fundamental sustainment imperatives (anticipation, integration, continuity, responsiveness, and improvisation) in FM 100-5 will be included in the revisions. Therefore, it is these imperatives that should capture the essence of the Combat Service Support Doctrine. Each will be examined to develop an understanding of how it relates to the tenets and in turn influences the sustainment system.

Anticipation: "The agility of a force, its ability to seize and retain the initiative, and its ability to synchronize its activities in depth all depend to a great extent on how well its support operations anticipate requirements."¹⁰ As with the tenet of agility, anticipation requires both physical and mental qualities. Most certainly this is what the master of mobile warfare Field Marshal Erwin Rommel had in mind when he said:

The first essential condition for an army to be able to stand the strain of battle is an adequate stock of weapons, petrol and ammunition. In fact, the battle is fought and decided by the quartermasters before the shooting begins. The bravest men can do nothing without guns, the guns nothing without plenty of ammunition; and neither guns nor ammunition are of much use in mobile warfare unless there are vehicles with sufficient petrol to haul them around. Maintenance must also approximate in quantity and quality to that available to the enemy.¹¹

This does not imply that sustainment and operational planners are clairvoyant with an unerring vision of the future, but it does demand that their efforts be totally integrated and that they share an accurate common

understanding of the commander's intent for future operations and the associated combat service support requirements. For only then can they ensure that the plan is supportable.

For sustainers at each level this means that while they continue to support current operations, at the same time they must develop a support concept and build up capability that assures assets are available to sustain anticipated operations. Moreover, sufficient flexibility must be retained so that the support system is able to adjust to accommodate the inevitable unforeseen contingencies, opportunities to seize the initiative by exploiting an enemy weakness or respond to a threat against friendly forces. This implies that anticipation or planning is a continuous process, requiring constant adjustments of the support structure based on current and projected requirements.

In actual execution this requires a flexible, highly mobile structure tailored to the requirements of the total force, one that allows the maneuver force to conduct independent, self-sustained operations. The structure must be robust enough to allow operations from multiple locations, along separate routes and to adjust quickly to changes in task organization. This requires asset visibility and the means for rapid redistribution where the most critical need exists throughout the depth of the battlefield. At the lowest levels this may be nothing more than increasing the basic load to be carried by each soldier or cross leveling of loads or critical supplies among individual soldiers and weapon systems. At higher levels it may involve repositioning the support bases, prepositioning or programming assets forward,

using multiple lines of communications and transportation modes to mitigate their interdiction, or establishing a mobile support base with critical sustainment assets uploaded for rapid redistribution.

Integration: "Neither tactical nor operational plans can succeed without fully integrated combat service support. The commander must assure that his overall operation is supportable at every stage of its execution."¹² This begins with the planning process where operations and sustainment are totally integrated, both reflecting a clear understanding of the commander's intent. Then it must continue through operations, where the actual sustainment functions (manning, fueling, arming, fixing, transporting, and protecting) are performed so that they are in fact combat multipliers and do not become limits on the commander's freedom of action. Integration must foster cohesion and the formation of a 'common cultural bias' or mutual understanding about how the battle will be fought and supported. This requires a combat service support system tailored, organized and equipped to meet the requirements of the total force, one that is integrated into the task organized maneuver force, trains with it, and supports that force in peacetime as it will on the AirLand battlefield. Implicit is a wartime sustainment system that can be tested, revised and 'standardized' in peace to meet wartime requirements. All components of the force-combat, combat support, and combat service support- must develop an habitual association that allows common procedures and techniques to develop that will be followed in combat operations. For only by making combat operations routine will the system be able to handle the contingencies requiring nonstandard unique solutions.

Improvisation: "No matter how carefully commanders and planners try to anticipate events, unforeseen contingencies arise in every conflict."¹³ The

certainty of uncertainty on the AirLand battlefield makes improvisation or deviation from developed plans and support concepts a prerequisite for success. However, it should not connote a lack of anticipation or planning but rather be a complement to it. It has been said that a plan only lasts until it is implemented. Such statements merely recognize that regardless of how carefully planners try to anticipate events, friction in the Clausewitzian sense and enemy actions will cause plans to change. In such situations the sustainment planners and operators must know when to suspend normal operating procedures and how to resort to extraordinary methods, probably accepting exceptional risks in the process.

History is replete with examples where successful improvisation proved to be a critical factor in the outcome of a battle or operation. FM 100-5 highlights two, the 1944 Battle of the Bulge and the Tet offensive of 1968.¹⁴ Clearly the creation and operation of the ad hoc Red Ball Express in August 1944 to support First and Third Armies' unforeseen rapid advance across France was improvisation at the operational level.¹⁵ Increasing individual loads, exceeding truck weight capacity and using combat vehicles to augment resupply capability were used as tactical expedients by the 4th Armored Division during the same period.¹⁶ Armies have traditionally used captured enemy and locally available materiel, cannibalized damaged equipment, and devised innovative uses for equipment, often with decisive results. Invariably, improvisation will be required if sustainers are to ensure responsive support.

Responsiveness: "In crisis or when fleeting opportunities arise, the sustainment system must react rapidly."¹⁷ If our vision of the future battlefield approximates reality, the tide of battle will decisively change in a matter of minutes and units must be able to react quickly to take advantage

of enemy weaknesses or to counter threats. Forces will routinely be isolated and must be prepared to deal with the unexpected and to fight independently at any given time. Support must be well forward to maximize the combat potential of weapons systems. This requires an agile combined arms maneuver force capable of self-sustained, independent operations. This force must be structured with all components, combat, combat support, and combat service support organized, equipped and trained the way they expect to fight.

Responsiveness of the sustainment system is a direct determinant of total force agility. Therefore, the support structure must provide the necessary mobility, flexibility, robustness and self-protection to ensure continued sustainment to the force when LOCs are interdicted and after suffering attrition. For only then will there be the capability for improvising and surging capabilities to relocate or reorient rapidly the support base to meet the changing requirements. The mental and physical agility to cope with such requirements must be built into the sustainment system in advance through an effective organization structure which has been exercised and refined based on realistic training.

Continuity: "Sustainment can not be interrupted for long without directly diminishing the combat power of a force. During operations, committed forces--combat, combat support, and combat service support--must receive continuous supply and service to sustain their fighting strength."¹⁸ To ensure uninterrupted support has never been achievable and certainly won't be possible on the dynamic AirLand battlefield that we envision. Therefore, the challenge to the sustainer is to minimize the effect on the maneuver force when the certain interdiction does occur.

Commanders and supporters must take advantage of every opportunity to restore or increase sustainment capability. Priorities can be adjusted to increase support to critical units or during decision periods. Lulls or periods of operational inactivity can be used to replenish the sustainment base or reconstitute combat units. Combat service support units have the ability to surge and increase their capabilities for limited periods. Concurrent with these extraordinary methods, normal sustainment operations are being performed. These and other improvisations will have to be used; however, as they require the sustainment system to operate constantly, their long term effect must be considered and planned for to prevent future degradation of capability.

Sustainment operations can never be allowed to become hostage to a single line, mode or supply source. Redundancy must be provided. The support planner does this through some combination of forward positioning of supplies and units, or use of multiple lines of communications, modes of transportation, and support facilities. This allows the force to be sustained in the event of the loss of any one. Since the price of this redundancy is normally a reduction in efficiency and ability to support future operations, it must be balanced against the risk of interdiction.

To ensure continuity the sustainer must totally integrate the characteristics of the other sustainment imperatives into everything he does. He must anticipate requirements and develop an integrated, flexible support/operational plan based on the commander's intent, then be prepared to improvise and respond to the inevitable changes that will occur.

In summary, it should be clear that the sustainment imperatives are inextricably related among themselves. It should be equally clear that these sustainment imperatives support the AirLand Battle tenets and as such, form the basis for a combat service support doctrine which is consistent with AirLand Battle doctrine. This matrix is useful to summarize their linkage to the tenets.

Relationship of Imperatives to Tenets

	anticipation	integration	continuity	responsiveness	improvisation
synchronization	x	x		x	
agility	x	x	x	x	x
depth			x	x	x
initiative	x			x	x

As shown previously it is agility that best captures the requirement for maneuver force success on the AirLand battlefield. It also best describes the characteristics of the combat service support system required to sustain that force. Since agility lies at the heart of both operational and sustainment effectiveness, it will be used as the criterion for evaluating the effectiveness of the current sustainment system.

COMBAT SUSTAINMENT SYSTEM

Thus far the linkage between the combat service support and AirLand Battle doctrine has been established, and the doctrinal characteristics to which the sustainment system must conform developed. But the fundamental question remains, can the current system adequately support the heavy division? The answer to this question normally is based on a quantitative analysis of anticipated requirements verses sustainment capabilities. Such an approach warrants examination. To assist in this analysis the U.S. Army Logistics Center, Fort Lee, Virginia developed consumption data for a balanced heavy division, five M-1 battalions, five M-2 battalions, and one attack helicopter battalion. The planning factors used were those in the Draft FM 101-10-1 scheduled to be published in fourth quarter FY 86. These factors are based on revised consumption data and are significantly more accurate than those in the current FM 101-10-1.

Several computer driven requirement scenarios were developed by the LOGCEN. The one selected for illustration is based on a moderate intensity defense. It is not the most nor least demanding case for the combat service support system. It can be argued that for such an analysis the worst case

scenario should be used to evaluate the sustainment system's capabilities. I believe that the increased requirements of such a scenario are not representative and can be offset by the sustainment system's ability to surge and achieve unquantifiable increases in capability for short periods. Further, it is the ability to support the sustained rate of consumption that will ultimately determine success or failure.

The following chart summarizes by class of supply the requirements, and capabilities of the division. The daily requirements are from the LOGCEN computer generated data. The capabilities are derived from those reflected in the appropriate heavy division SRC 8700J480. As can be seen, with throughput of 21 short tons of rations and 61,000 gallons of fuel by corps vehicles and the maneuver battalions going back to the ammunition supply points to pick up 1908 short tons of ammunition (which are in accordance with current support concepts) the division has the capability to sustain itself.¹⁹

Based on this comparison alone one could conclude that the heavy division has adequate combat service support. However, this is a single dimensional analysis comparing requirements against design capabilities, and as such is not adequate for the purpose of this paper. It fails to consider the effects of supporting those requirements on a nonlinear battlefield employing AirLand Battle doctrine. Accordingly we need to turn our attention to an examination of how well the current sustainment system conforms to the doctrinal sustainment imperatives and characteristics previously developed. In so doing we will assess the executability of the doctrine on the battlefield to determine if the sustainment system contributes to maneuver force agility and success. To do this we will look at the division's organization for support, support concepts and equipment.

COMPARISON OF HEAVY DIVISION OF CAPABILITIES VERSUS REQUIREMENTS

Class of Supply	Daily Requirement In short tons	Daily ⁶ Capability In short tons	Explanation
I	60.2 ¹	68.5	Within total division capability but requirement within exceeds FSB S&S Company. Requires throughput of 21 ST to the FSBs on Corps transportation assets
II	31	101.4	Combine class II, III (pkg), IV and VII into a single operation and the capability of 199.9 ST. meet the requirement of 153.1 ST.
III(pkg)	34.4 ²	17.97	See Class II above.
III(bulk)	471,900 ² gallons	410,000	Use half of the FSP and half of authorized 5,000 gallon tankers. Requires 61,000 gallons throughput to the FSBs by corps.
IV	71.5	38.6	See Class II above.
V	2908 ³	1,000	Considers ATPs operating at 80%. Requires maneuver battalions to make two round trips to the ASP/CSA to pick up 1908 ST of ammunition.
VII	16.2 ⁴	41.9	See Class II above.
VIII	10.3	10.3(+)	There is no rated capacity for the medical supply system; however, the requirement can be supported by ambulances evacuating patients backhauling supplies.
IX	52 ⁵	52(+)	Class IX supply is not rated in ST per day, but the gross tonnage can be supported. There will be shortages of specific items which will effect the repair of individual systems.

Notes:

- 1 Based on consuming two T rations and one MRE
- 2 Based on following usage profile (hours of operation):
 - aviation - 4.0
 - construction - 12.0
 - generators - 12.0
 - material handling - 12.0
 - stationary equip (misc) - 12.0
 - stationary equip (vehicle mounted) - 12.0
 - track vehicles
 - idle - 3.8
 - cross country - 5.6
 - secondary roads - 5.1
 - wheeled vehicles - drive 100KM
 - other vehicles - 12.0
- 3 Ammunition consumption was computed for, attack defend; in light, moderate, heavy intensity; and for first day and sustaining. Consumption ranged from a low of 1190 ST for attack, light, sustain; to a high of 4474 ST for defense, heavy, sustain. The rate reflected is for attack, moderate, sustain.
- 4 Total class VII consumption is 550 ST, that reflected is what requires transportation.
- 5 Repair parts consumption was computed for light moderate, heavy intensity. Consumption ranged from a low of 40.3 to a high of 80.6, that shown is for moderate intensity.
- 6 Capability, reflects the combined capacity of the MSB and FSBs.

ORGANIZATION FOR SUPPORT

There have been significant changes in the support structure and concepts used to sustain heavy divisions since World War II when divisions were designed around General McNair's concept of the triangular division. The triangular division structure stripped out all non-essential organizations and soldiers to "concentrate a maximum of men and materiel in offensive striking units."²⁰ The units thus removed from the divisions were predominantly combat support and combat service support, which were reduced in number (taking advantage of technological improvements and economy of scale) and were consolidated or "pooled" at corps and army level respectively. These units were then attached back to the divisions based on operational requirements. General McNair's intention was to create divisions and corps that were truly maneuver forces and headquarters of concentration respectively. In fact, doctrine called for self-sufficient divisions that could rapidly shift from one corps to another.²¹ To that end he personally directed that "divisions and corps are not in the channel of supply except in emergencies."²² He believed that the supply points could and would be pushed forward by the Army headquarters at the rate of maneuver force advance, so that the "using units would not have to haul supplies more than twenty to thirty miles."²³

General McNair's concept was theoretically and doctrinally sound. In fact it proved to be effective in the peacetime environment, but it did not accurately envision the requirements of the battlefield and the capability of the sustainment system to meet those requirements. The rapid buildup of combat forces without a corresponding increase in support capability prevented the necessary stockpiling of supplies to sustain operations adequately. There

were not enough of the "pooled" units to satisfy support requirements and they could not be shifted on the battlefield quickly enough to provide responsive support. The shortage of support units and disparity in mobility made it physically impossible for the sustainment base to advance at the rate of the combat forces. His concept proved to be unworkable. Hasty improvisation was required. Support units were modified, new ones created; and they were semi-permanently assigned to divisions and corps establishing them as the administrative and tactical headquarters we have today.

While the corps and divisions have undergone several changes in design, today they have become even more principal sources of logistical support. In comparison to World War II, the corps has assumed most of the sustainment responsibility previously performed by the field armies. It is organized with a corps support command (COSCOM) having a variable number of subordinate non-divisional combat service support units. The number and type of units depend on the divisions normally assigned to the corps. The COSCOM provides general support and backup direct support (supply, maintenance, transportation, medical, and field services) to all corps elements.

Within the current heavy division, redundancy, flexibility and responsive support are doctrinally accommodated by having combat service support elements at each level from company through division. In contrast to the corps, this logistics structure is essentially fixed by tables of organization and equipment (TOE) based on the type division. Additional capability is provided by augmentation of additional combat service support units, primarily from the COSCOM.

The division support command (DISCOM) has the mission to provide division-level logistics support to all organic or attached elements of the division. It is organized to provide the maximum amount of combat service support within prescribed strength limitations, while providing the most effective and responsive support to tactical units in a combat environment. Like the COSCOM it provides supply, maintenance, transportation, medical, and field service support. In order to provide responsive support to the tactical commander, the logistics, medical, and administrative services are functionally organized and positioned in the areas requiring support. Specifically, the DISCOM is organized with a main support battalion (MSB), a forward support battalion (FSB) for each ground maneuver brigade, an aircraft maintenance company (AMOC), and the division materiel center (DMMC). The object of the support it provides is to keep the systems of the division operational.²⁴

The ground maneuver brigade is a tactical headquarters, and as such does not have any organic combat service support units other than those sections which support the headquarters and headquarters company. However, "dedicated support" is provided to the brigade and its 'brigade slice units' on an habitual association basis by a forward support battalion (FSB). While the FSB is subordinate to the DISCOM, for all practical purposes it is the brigade's combat service support element. It ensures that its brigade units have sufficient food, repair parts, ammunition, fuel, maintenance, and medical treatment, and it coordinates with the DISCOM rear to provide all other nonorganic support required. The FSB is the brigade commander's single,

multi-functional point of contact for all combat service support. To provide this support the FSB is organized with a headquarters and headquarters detachment and supply, medical, and maintenance companies.²⁵

Under the Army of Excellence (AOE) structure the combat service support elements in the maneuver battalion have been consolidated in the headquarters and headquarters company. The company is organized with support, medical and maintenance platoons that perform unit level support for the organic maneuver companies and serve as their link with the divisional direct support base in the division support command (DISCOM).²⁶

The maneuver company is the basic consumer of support and is the lowest organizational unit with personnel assigned to perform combat service support functions. It is from this level that supply requests, personnel status reports and other requirements for support originate. The company is not designed to be self sufficient. It has the fuel in its vehicles and a basic load of ammunition and rations. When those are consumed it is dependent upon its parent battalion for all support.

Conceptually, agility is enhanced by the organization and positioning of these combat service support elements throughout the division area. This is accomplished by the use of logistics trains and support areas. Trains are any grouping of personnel, vehicles and equipment assembled to provide support to a unit. They are designed to simplify the coordination and control of logistics assets while providing more immediate responsive support, flexibility in usage, and increased survivability of assets. They can be centralized at one location, unit trains, or can be echeloned into field and combat trains. The exact composition of the trains is tailored to contain the combat service support elements that are critical to support the forces

engaged in battle. Normally, they include class III and V, unit maintenance teams and medical support. They are completely mobile and move with the maneuver force to provide responsive forward support.²⁷

A support area is a geographic area where a unit's logistical elements are found, normally located toward the rear of the units supported from it. Within the division's area of operation, there are company support areas, battalion support areas, brigade support areas (BSA), and the division support area (DSA). The company support area is that portion of the company rear occupied by the company trains; and it is normally located out of enemy direct fire, between the battalion support area and the FLOT. The battalion support area is that portion of the battalion rear occupied by the battalion combat trains and the forward elements of the supporting forward support battalion (FSB). It is usually positioned one terrain feature behind the lead elements, between the BSA and the company support area. The BSA is that portion of the brigade rear where the FSB and the battalion and company field trains are positioned. It is normally located approximately 20 kilometers behind the FLOT to afford protection from enemy indirect fire weapons up to 130mm. That part of the division rear area where the DISCOM command post, organic (less FSBs), attached and COSCOM supporting units are located is the DSA. Doctrinally it is 50-60 kilometers behind the FLOT, between the division rear boundary and the BSAs.²⁸

Conceptually, it appears that the combat service support systems within the division are structured in accordance with the characteristics previously developed. There are elements integrated at each echelon from company through division (this is correct if the FSB is considered to be that element for the ground maneuver brigade). These elements are tailorable to provide flexible,

responsive support necessary at the respective levels. They are geographically positioned and echeloned throughout division's sector to provide redundancy, survivability and continuity through depth. But to determine if the conceptual sustainment system is executable, we need to examine how the five functions of logistics, supply, maintenance, medical, transportation and services, are performed.

Organization For Supply Support

"Supply is the process of providing all items necessary to equip, maintain, and operate a military command. It involves the procurement, storage, distribution, maintenance, and salvage of supplies."²⁹ In the division supply includes determining requirements and requesting, processing, storing and distributing materiel to satisfy those requirements. The levels of essential supplies maintained by the division are determined by the DMMC based on actual usage experience or as established by corps or Department of the Army regulations. The focus of supply operations is to deliver, to the maximum extent possible, supplies to forward areas using division or corps transportation assets (utilizing the concept of throughput to minimize multiple handling). The organizations involved in providing supply support within the division include the DMMC, MSB (supply and service, medical, light maintenance, and missile maintenance companies), FSB supply company, and the maneuver battalion's combat service support platoons.

Three classes of supply have traditionally been identified as critical for the success of any type of tactical operation. These are Petroleum (Class III), Ammunition (Class V), and repair parts (Class IX).³⁰ The consumption

rates of each are directly dependent on the type of operation, offense or defense. During the offense there is typically high fuel consumption and low ammunition expenditure. While fuel consumption usually decreases during the defense, ammunition usage will increase. In both operations repair parts supply is directed toward supporting the maintenance repair forward concept. Without a continuous flow of these supplies the maneuver force will be unable to sustain combat power. This demands that the sustainment system focus and give priority to their adequate and timely provision. The first to be examined will be class III.

Within the division, there are four battalions and a brigade that receive, temporarily store, issue, and distribute class III bulk fuel supplies. These are the combat aviation brigade (CAB), the MSB, and the three FSBs (located in the BSAs). The petroleum storage and issue section, S&S company, MSB, operates the main class III distribution points in the DSA. The petroleum section of the FSB supply company operates the class III distribution points in the BSA. Additionally, bulk aviation fuel distribution points are located and operated by the CAB. Management is the responsibility of the DMMC. The management system is not automated and requires the daily submission of manual reports from all units company through division.³¹

The supply of bulk fuel is scheduled as opposed to being formally requisitioned, and is based on forecasted requirements developed by the consuming companies or battalions. FM 63-2-2 provides guidance on the period covered by the forecasts, "In order to ensure adequate reaction time and availability of fuel, forecasts should cover the 72-hour period beyond the next day."³² For example, the forecast for the 1st day should be the projected requirements for the 3rd, 4th, and 5th days. This implies that the

division is developing operational plans in sufficient detail, at least 96 hours in advance, so that fuel will be available when and where it is needed--a condition which is highly suspect given the fundamental requirement for agility. While it is recognized that under unusual conditions these times can be reduced, the system is not designed for, nor can it support continually operating inside the constrained timeframes.

Distribution of fuel envisions a constant movement of tankers from corps as far forward as the BSAs in a closed loop, full ones moving forward and empties returning. Using the LOGCEN consumption data this would require approximately 100 5,000 gallon tankers every 24 hours. This distribution system presupposes that unit locations are known and remain unchanged for lengthy periods, and equally important it is dependent on timely communications and adequate secure LOCs. Each of these assumptions is questionable given the AirLand battlefield environment.

Resupply of aviation fuel normally is performed by COSCOM assets delivering directly to CAB tankers. Doctrinally, these tank trucks are supposed to be capable of storing two days of supply of class IIIA for the brigade,³³ however, the current MTOE has deleted the required 5,000 gallon tankers. With currently authorized refuelers there is a total capacity of less than one day's stockage. The MSB is required to provide back up support to the CAB and to maintain an additional one-day reserve supply.³⁴ Considering that the CAB can store less than one day, this means that if three days of JP4 are to be on hand, the MSB must plan to store most if not all of it. Because of the time consuming procedures required to convert a fuel vehicle from one type of fuel to another (especially JP4), tankers cannot rapidly be switched based on changing fuel requirements. This will cause

tankers to be diverted from ground fuel and dedicated to JP4 service, even though the most immediate need maybe for ground fuel, thus further exacerbating the shortage of mobile ground fuel tankers and support to ground operations.

To allow the commander the agility to exercise initiative requires mobile fuel systems, however, the division's primary storage capability, 120,000 gallons of bulk fuel, is the non-mobile fuel system supply point (FSSP). It is this system that maintains the reserve stockage of Class III. The normal concept for its employment would prevent achieving its full planning capacity. Under the best conditions it takes 8-10 hours to emplace the system, fill it up, and become operational. Before it can be relocated the fuel must be emptied, which may take several hours depending on current consumption. When empty the system can be displaced, requiring the same time to become operational again. If the time and location for movement are known in advance (10-12 hours), the drying up of the system and site preparation can be managed. But with little or no notice, it may be impossible to use it to provide responsive support. Actual employment should break the system down in half or thirds and "leap frog" it to support the maneuver force movement. This would improve responsiveness, enhancing agility, but it would reduce the division's on ground fuel storage by half or thirds.³⁵

The most serious constraints on the Class III wartime distribution system may be those imposed on it by the peacetime system-to train adequately, and to develop common procedures and practices that will be used in combat. At most installations garrison support is provided from a fixed gas station where individual vehicles are refueled, or unit refuelers fill up at the POL tank farm, return to the unit motor pool and refuel the individual vehicles.

'Normal field support' usually involves the unit refuelers filling up at the tank farm and going to the field where they refuel the individual systems. Battalion task force and brigade sized exercises do not create the consumption required to set up, operate, and stress the entire system. What usually happens is the maneuver force continues to use the garrison system; or if the 'wartime' system is deployed there is more support provided than would be possible in combat. Either of these situations, instead of causing common procedures and techniques to develop, teaches bad habits for both the supporters and the supported. Further complicating the problem are regulatory and legal constraints. Environmental policies greatly limit petroleum operations, and current fuel accountability requirements simply cannot be met with systems like the FSSP.

Ammunition is the only critical class of supply for which the division maintains no stockage above company level. Its resupply is based on a continuous refill of the system. As stocks are issued they are replaced by those moving forward from the rear. Companies carry a basic load, which is defined as "that quantity of ammunition required to sustain a unit in combat until resupply can be accomplished."³⁶ In fact the actual quantities are constrained by the unit's ability to store and transport the ammunition. The length of time the basic load lasts is directly dependent on the intensity of combat and may or may not be relevant to the resupply time. Resupply is based on an allocation system where requirements are developed at each echelon to sustain operations for a specific period. This is the required supply rate (RSR). The allocation, or controlled supply rate (CSR), is established as the rate of use that can be sustained within available supplies.

Units involved in ammunition resupply are the MSB, FSB, and DMMC. The division ammunition officer (DAO), assigned to the DMMC, performs ammunition's management for the division by authenticating requests, managing the CSR, and exercising overall coordination and control of Class V supply. He or his representative validate all ammunition requests before the unit is allowed to receive ammunition from the COSCOM ammunition supply point (ASP), corps storage area (CSA) or a division or brigade ammunition transfer point (ATP).³⁷ As with the management of class III, ammunition management is not automated. Furthermore, it is dependent on reliable communications with as many as seven locations spread the width of the division sector and from the BSA back into the corps area. A difficult task in peacetime, it may prove impossible on the airland battlefield.

There is one ATP established in each brigade support area and one in the BSA. The ATPs consist of the personnel and materiel handling equipment to transload palletized ammunition from corps trailers to using units vehicles. Corps tractors move forward on a prescheduled basis and drop the full trailers, when the next resupply comes forward, the empty trailers are backhauled. Collectively, the divisions' ATPs can handle approximately a third of the total daily ammunition requirement; the other two thirds must be picked up at the corps ASP in the vicinity of the division rear boundary. Doctrinally the ASP is close enough to allow a maximum of 4 1/2 hours turnaround for unit resupply vehicles.³⁸ To maintain this turnaround time/distance over time requires the frequent relocation of ASPs that physically cannot be supported within current capabilities.

FM 100-10 advises that the ATPs should be relocated periodically to prevent detection and targeting by the enemy.³⁹ However, once the trailers

are dropped they become immobile; and the ATP has only limited ability to reposition but no means to move or relocate them. This lack of mobility presents several problems. The most serious is that it denies the commander the ability to move the ammunition when he decides to maneuver to take advantage of an opportunity or counter an enemy threat. It is highly probable that given the Airland battlefield the maneuver force could be critically short ammunition, have the ammunition in the ATP and be unable to get to it because the enemy has interdicted the supply route.

Like fuel distribution, ATP operations are based on a fleet of trailers in motion. They also require considerable response time (18-24 hours from request until arrival of ammunition) and are dependent on secure LOCs, timely communications, and a relatively static maneuver force support base. None of these conditions is likely to be encountered.

Another dimension to ATP operations is the large number of trailers it takes to make them work. As a minimum it takes more than twice as many trailers as are in the ATP to make the concept work (those actually in the ATP, a like number at the CSA being loaded for the next resupply, and some quantity undergoing maintenance). For a division this would take approximately 110 of the new 22 1/2 ton semitrailers or 200 of the old 12-ton trailers daily.⁴⁰ The sheer number of trailers required may make it viable only on a limited scale. This creates increased requirements for units to go to the corps ASP/CSA to pick up ammunition, for which they are not organized.

Similar to fuel distribution, the most serious ammunition constraint may be the inability to train, test and revise the wartime system adequately during peacetime. Training ammunition is normally allocated based on an approved annual training program to conduct specific events, e.g. tank

gunnery, with the ammunition allocation broken down by quarter. Based on the allocation/training plan, the unit submits a request through the DAO to the post ASP, and using organic transportation goes to the ASP and picks up the ammunition. Normally, the ammunition is drawn in bulk, taken to an ammunition holding area where it is secured, and only quantities for immediate consumption are moved forward to the units conducting training. Moreover, these procedures in no way develop the ability to transition to a wartime system where ammunition requirements are developed to support combined arms operations (RSR); nor do they and develop an appreciation of the effect constrained (CSR) ammunition will have on tactical and operational plans. Another part of the problem is that the consumption of ammunition to support peacetime training does not approximate that necessary to deploy, set up and operate the 'division's slice' of the class V system (CSA, ASP, and trailer transfer point.) The fact that most of the corps ammunition units are in the reserve component further complicates conducting training. Additionally, there are cogent legal, safety and security reasons to restrict the peacetime system. However, without exercising the wartime system, problems in coordination of the disparate activities required to make it work (COSCOM, MEC, AGC, CSA, ASP, within the division, G-3/4 planners, FSBs, MSB, and DAO) will not be identified and resolved. Since the division carries no reserve stocks of ammunition and has no visibility of or way to redistribute the unit basic loads, the wartime system has to work right--the first time.

Repair parts, like ammunition and fuel, are critical to keeping weapons systems in the battle and returning those that become damaged or inoperable to the fight. Class IX supply consists of the repair parts and repairable and non-repairable components that are required for maintenance support of all

equipment. There are two aspects of class IX supply which make it different from the system used for providing general supplies. First, a large number of repair parts are routinely supplied from CONUS depots by air lines of communications (ALOC), in some cases to division level. Second, repair parts are supplied within the division by maintenance units rather than by supply organizations. Units performing repair parts supply include the AMCO for aviation unique parts, MSB (light maintenance company for common items, missile support company stocks missile peculiar parts, and medical parts are stocked and supplied through the medical support company), and FSB (maintenance and medical companies). Management is the responsibility of the DMMC.⁴¹

The DMMC, MSB, and FSBs use the automated DS unit standard supply system procedures to perform the division class IX supply management and accounting functions. Class IX is the only critical supply currently automated. This system provides visibility of divisional authorized stockage list (ASL) assets and gives to the DMMC the ability to cross level repair parts or major assemblies where they are most critically needed to support the division commander's battle. It operates in peacetime essentially as it would in war. However, there are some limitations: data is not real time (normally an update is run at least daily); and it is dependent on a viable communications system, uninterrupted division data center computer support (there is no manual backup), and a transportation system to redistribute the parts. These notwithstanding, automation does add a degree of agility to the class IX system not possible with the other classes.

Companies are the basic consumers of repair parts and are authorized a prescribed load list (PLL) to support assigned equipment. The PLLs are collocated in the battalion's maintenance platoon and the number of lines are constrained to allow them to be mobile. When the company is task organized into a battalion task force, its PLL is designed to be broken out and moved with it.⁴² However, the PLLs are for all practical purposes consolidated because current MTOEs do not authorize enough PLL/TAMMS clerks or PLL trailers in the maneuver battalion maintenance platoon to allow all the companies PLL's to be broken out at the same time. Furthermore, there is no ability to break the PLL below company level when company teams are formed. This is a significant problem if the team remains within the parent battalion, but it becomes even more significant if the unit is task organized with another battalion that is not similarly equipped.

The source of Class IX supplies for maneuver units is normally the supporting maintenance company. This DSU maintains a portion of the division's ASL. Stockage quantities are determined on the basis of an economic order quantity formula. In terms of days of supply (DOFS), the quantities of a specific item within the ASL may range from a 30 to 365 day level or more,⁴³ dependent upon the order and ship time and demand criteria. To prevent overstockage in the BSA, the DMMC, in coordination with the MSB materiel officer, specifies the items and quantities of class IX materiel to be physically located in the forward area. These determinations are based on the PLLs of the units to be supported and the immediate mobility requirements of the forward support maintenance units, which are designed to maintain approximately 3,000 lines uploaded and mobile. The remaining stocks of the division ASL are maintained by the appropriate maintenance operating unit.

(i.e., conventional, missile, aircraft) normally located in the DSA. Current heavy division ASLs range from 6,000 to 10,000 lines and are based heavily on peacetime usage.⁴⁴ In most cases the current number of lines stocked still exceed the ability to achieve 100% mobility. The size is being reduced by eliminating the nonessential comfort and cosmetic items and by identifying the items stocked because they are required solely for peacetime operation, such as those to comply with legal or safety requirements. These items are being stripped out and stored and managed separately, thus making the 'combat ASL' deployable and mobile.

The missile peculiar ASL is uniquely managed and has the potential to affect combat power significantly. Stockage is based on peacetime usage which does not approach anticipated combat consumption. Additionally, there is not sufficient stockage in the inventory to support requirements in accordance with normal supply procedures. Because of the limited quantities and the criticality of the components to supported missile system readiness, a closed loop supply system has been established where the requisitioned items are shipped from the contractor or AMC depot directly to the division's missile support company. It is planned that this system will also be used to support wartime requirements. A difficult enough system to make work in a nonmobile peacetime environment, it most probably will prove to be unresponsive on the AirLand battlefield.

Another aspect of supply is the number of days of stockage (DOFS) that the various combat service support units maintain. Reflected are the three critical classes of supply and the normal DOFS within the division.⁴⁵

<u>Class of Supply</u>	<u>DOFS*</u>
V	Basic load
III bulk	less than 1 to less than 3 days
IX	30-365(+)

*dependent on corps/theater commanders guidance, but based on the current peacetime system, and doctrinal guidance these are the approximate DOFS.

While there are understandable reasons for all the classes of supply not to have identical days of stockage (predictability of consumption, interchangeability, etc.) it would appear that they should be reviewed. For the class with the least DOFS will determine how long the force is self sufficient, and it makes no sense to have numerous days of repair parts on hand if the maneuver force becomes combat ineffective because it has no fuel or ammunition. Reallocation of resources, personnel and equipment from one class to another may be appropriate to help bring the period of total sustainment for the division into closer balance.

Organization For Maintenance

"Divisional maintenance includes preventive maintenance to keep equipment in an operational condition; unit maintenance characterized by quick turn-around based on minor repair, and maneuver unit LDSM support characterized by high mobility, a forward orientation, and repair by replacement."⁴⁶

The maintenance system has recently been restructured to provide more responsive support, improve operational readiness and increase battlefield mobility and flexibility--to improve maneuver force agility. Divisional and

nondivisional maintenance, units have been reorganized and the old four categories, organizational, DS, GS and depot maintenance have been replaced by the three levels of unit, intermediate, and depot. Unit level maintenance is characterized by operator or crew maintenance, scheduled, and unscheduled maintenance, minor repair, and quick turnaround of damaged equipment through repair by part or component replacement. Intermediate maintenance has two components, intermediate direct support (IDSM) and intermediate general support maintenance (IGSM). IDSM applies the principle of repair and return to user, while IGSM is performed in support of the theater supply system. Depot maintenance supports the wholesale supply system and is performed by the Army Materiel Command activities or contractors. IDSM is normally the highest level of maintenance support provided within the division.⁴⁷

The corps and divisional maintenance units have been reorganized to perform IDSM with emphasis on mobile flexibly tailorable teams and detachments. The large semi-fixed and immobile intermediate general support maintenance units previously in the corps were not compatible with the need for mobility. They were moved behind the corps rear boundary where they support the theater supply system and their lack of mobility is not a limitation. Since these units previously provided backup support to divisional and nondivisional direct support units, this move out of the corps created a void in the corps support capability. Additionally, the redesign of divisional units and their focus on repair by component replacement caused a shortfall that was passed along with much of the component and major assembly repair back to corps units. The creation of corps standardized IDSM units was designed to fill both these needs, and specifically to make up for the divisional direct support maintenance capability shortfall. The corps base

company is organized and equipped to provide class IX supply support and repair of common equipment, but it also can be tailored to specific support requirements. Area support is provided from a base shop while backup/reinforcing support is performed by highly mobile support teams forward in the DSA. The company also has limited capability to reconstitute divisional maintenance units.⁴⁸ This restructuring clearly enhances the division's maintenance capability and agility.

The thrust of the divisional maintenance system is toward repairing damaged weapons systems and equipment as far forward as possible to maximize their combat availability and thereby reduce or eliminate recovery and evacuation time. The organizations performing maintenance within the division include the light, missile, and heavy maintenance companies of the MSB, the FSB forward maintenance company, the AMCO, and the maneuver battalion's maintenance platoon. There are two other organizations that perform IDSM primarily in support of their own mission, the signal battalion for organic COMSEC equipment and the military intelligence battalion on MI unique equipment.⁴⁹ Neither of these will be discussed.

The DMMC provides overall IDSM management within the division. Like class IX supply, the peacetime organizations and procedures are essentially the same as in war. The most significant change will be relaxing of peacetime equipment serviceability standards, eliminating cosmetic and nonorganic essential safety maintenance tasks through the concept of mission essential maintenance only (MEMO) to perform those tasks required to restore primary mission capabilities of systems and return them to the fight. However, the same support relationships will remain in effect.

Unit maintenance is a critical link in the total maintenance system. The operator/crew, company maintenance section, or organic maintenance teams (MTs) from the maneuver battalion maintenance platoon are the first elements of the system to arrive at the breakdown site. The MT is designed to conduct battle damage assessment (BDA), and it makes the critical initial diagnosis that serves as the basis for determining if the damaged equipment is repaired on-site or recovered to the unit maintenance collection point (UMCP). The tailored MT is organized and equipped to support a specific type "pure" battalion (tank teams in tank battalions and mechanized infantry teams in mechanized infantry battalions). The teams are assigned on the basis of one team per company.⁵⁰ An habitual association is established between the MT and the company it supports that facilitates uninterrupted maintenance support when changing missions and battalion task organizations. The MT does not, however, have adequate capability to support at multiple locations if the company is broken up into company teams, especially if they are in more than one battalion--a significant limitation considering that companies are normally fought as combined arms teams. This will require the team to recover equipment to a central location, probably out of sector back to the parent battalion, to be repaired, thus increasing the systems down time, a condition that the "fix forward" concept is designed to minimize.

ISDM in support of the brigade area is provided by the FSB maintenance company. Consistent with tactical operations, these companies use MSTs to provide close-in support or on-site repair of critical weapon systems and establish a base of operation in the BSA. The MSTs are equipped with armored personnel carriers, M-113s, to provide protection and cross country mobility comparable to the maneuver forces they support. Their capabilities and

capacities are tailored like the maneuver battalion's MTs to the types and densities of equipment and units for which they provide support. Support forward is the primary mission of FSB maintenance company MSTs in support of weapon systems in tank, mechanized infantry, and artillery battalions operating in brigade sectors. MSTs are attached to the FSB maintenance company based on the type and number of maneuver battalions with one attached per battalion. The MST concept provides flexibility in tailoring the FSBs to support a different mix of battalions. Like the MT, an habitual association is developed between the MST and maneuver battalion that provides continuous maintenance when the battalion is moved from one brigade to another.⁵¹ However, it also has the same limitations on supporting at multiple locations when the 'pure' battalion is broken up and its companies are task organized into multiple task forces.

Doctrinally, emphasis is on rapidly repairing equipment by component replacement instead of piece part repair. The MSTs are deployed from the company to unit MCPs or directly to "downed" vehicles. Diagnostic information provided by the unit MT constitutes the basis for MST selection of personnel, TIME, tools, components, and repair parts necessary to make the on-site repairs. However, the limited number and vulnerability of the test sets necessary to perform fault isolation of electronic fire control and missile systems dictate that they be centrally located in the base shops in the BSAs or DSA. This affects virtually all the division's major weapons systems. These systems must be returned to the FSB, or in the case of most missile systems, to the missile support company in the DSA for repair. This increases

repair cycle time, need for recovery and evacuation (transportation assets), works at cross purposes with current maintenance concepts, and reduces maneuver force agility.

Organization For Medical Support

"The objective of military medicine is to conserve trained manpower. To achieve this objective, patients must be examined, treated, and returned to duty as far forward and as early in the phased health service support system as possible. Health service support functions must provide the utmost benefit to maximum personnel in support of the mission."⁵² Within the division, health services are designed to acquire, receive, sort and provide medical and surgical treatment for division and nondivision personnel in the division area. Support provided includes both unit level and division level.

Redundancy, continuity and responsive support are conceptually provided through depth by having medical elements at all levels from company through division. The organizations involved in providing health services include the DISCOM headquarters, MSB medical support company, the FSB forward medical companies, and the medical platoons of the maneuver battalions. The medical support company in the MSB and the medical company in the FSBs provide division level health service support.⁵³ The DISCOM medical operations section coordinates the division wide medical support and performs the patient regulating function using informal manual procedures. As with ammunition, it requires timely, reliable communications with all division and corps medical units. Unit level medical support is provided by the medical platoons of the maneuver battalions.

Doctrinally the focus of medical support is on timely disposition of casualties and support from higher to lower, with units organized, equipped and positioned accordingly. Medical assets are pushed down to subordinate units where rapid diagnosis and treatment either immediately returns patients to duty or evacuates them to the appropriate facility for necessary treatment. Divisional medical companies are structured to provide only limited holding capacity (120 cots for a maximum of 96 hours in the MSB),⁵⁴ thus ensuring that the division does not become tied to an immobile semi-fixed medical facility. Reorganizing the forward medical companies in the FSBs and equipping them with a combination of tracked M113s and wheeled ambulances has provided the necessary mobility and survivability to allow them to operate well forward with the maneuver companies and perform casualty evacuation throughout the brigade area.⁵⁵ Evacuation out of the division is a corps responsibility. Depending on patient condition, weather, the tactical situation, and availability, the patient may be evacuated by either air or ground ambulance--both of which require responsive communications and secure LOC's.

While the FSB forward medical companies are structured to be 100% mobile, the MSB medical support company is not. It is designed to displace in increments and requires transportation assets from the transportation motor company (TMT). Moreover, the corps hospitals are semi-fixed facilities requiring extensive time and resources to relocate, a critical factor effecting the mobility of the division. No matter how mobile the divisional medical system is, since it has no reserve capability, if the corps facilities can not stay within supporting distance, the mobility/agility of the division will be degraded.

Resupply of medical items is done through an informal system that is totally separate from all other supply procedures.⁵⁶ It is managed manually and is the responsibility of the division medical supply officer. Units submit requests to their supporting medical activity which issues the items, if on hand, or passes the requisition to the next higher medical unit. This same process is repeated at each echelon until the items are located and issued. They come back to the unit the same way, one echelon at a time. The evacuation system plays a vital role in this resupply system by providing backhaul to transport medical supplies. There may be good reasons to have life saving supplies like plasma and controlled drugs supplied differently. However, the common items could be provided more efficiently and responsively by having them automated and centrally managed by the DMMC like all other supplies. It is difficult to envision how the current informal system could effectively operate on the AirLand battlefield.

As with ammunition and fuel supply, potentially the most adverse aspect of the wartime medical system is the inability to train, test, and revise it adequately in peacetime. At most installations personnel assigned to divisional medical units are attached out to staff the hospital and troop medical clinics, only coming together and functioning as a unit on rare occasions. While technical skills may be enhanced in such an arrangement, it clearly does not foster the development of common procedures and practices that will be required to support the division in combat.

Organization For Transportation

"Transportation consists of those services related to the movement of personnel and materiel to meet the Army's requirements and commitments."⁵⁷ Adequate transportation has always been a critical element in maneuver force agility and the successful support of combat operations. It is the means by which the entire combat service support system functions: distributing supplies, evacuating damaged equipment, and moving personnel to where they are needed. While it takes on even greater importance considering increased maneuver force mobility and the emphasis on throughput and providing combat service support forward, it is doctrinally recognized as inadequate to meet anticipated requirements.

Units responsible for providing transportation support within the division are the maneuver battalion support platoons, the MSB, and the CAB on a limited or emergency basis. The principal ground direct support transportation asset is the transportation motor transport (TMT) company of the MSB. Employment of the TMT company's vehicles is centrally controlled by the DISCOM movement control officer in coordination with the division transportation officer (DTO).⁵⁸

At any given time, there will be a combination of theater army, corps, division, and user transportation vehicles in the division area. Theater army and corps assets will primarily consist of those involved in throughput delivery. Most of the truck and trailer assets will normally belong to the corps since corps general support units (GSU) are the primary source of resupply for the division and corps units operating in the division area. Except for ammunition deliveries to ATPs, and some bulk fuels, corps assets

will normally deliver to the division rear. Deliveries of large quantities of specific items may also be made directly to the user, for example, support for special projects such as the delivery of barrier material to engineer units. This allows the division's transportation assets to concentrate support within the division sector. As with all throughput, this requires forecasting requirements or requisitioning the supplies and projecting unit locations far enough in advance to ensure that they arrive when and where required. A significant problem will be controlling MSRs and traffic flow of what could routinely be well over 300 corps and divisional resupply vehicles all trying to travel between the BSAs, DSA, and Corps support facilities, a situation that could not only slow resupply but easily impede the lateral or forward commitment of maneuver forces.

The increased reliance on materiel handling equipment (MHE) has been a mixed blessing. While efficiency and unit productivity has been gained in support operations, this increased reliance on MHE has created additional transportation requirements. The combat service support units are now dependent on the MHE to perform their missions adequately, but the MHE is, in some instances, not self deployable. Nor in most cases, is it designed to make long road marches, and it can not maintain the same rate of travel as the rest of the unit. This places a requirement on the transportation system to move the equipment. Complicating the problem is the fact that HETs are the only vehicles capable of moving much of the MHE, and HETs are in short supply Army wide. Of the 24 authorized, most CONUS divisions have less than 8 on hand. Based on anticipated frequency of unit relocations and the quantity of

THE to be moved, the HETs would spend most of their available time moving MHE instead of their primary role of evacuation of damaged equipment or movement of serviceable combat systems.

Nonmobility has been designed into the TMT company. It is authorized twice as many stake and platform trailers as tractors to pull them.⁵⁹ This guarantees that it will take at least two trips to relocate the company or any unit it is moving. While this organization was adequate to support a distribution system designed for a linear, relatively static battlefield, it is not consistent with the need for maneuver force agility on the AirLand battlefield. In fact the requirement is for units to be 100% mobile, which is not currently the case. All DISCOM units require nonorganic transportation to displace (even the FSBs do not have transportation to move supplies that may be on hand or the damaged customer equipment awaiting repair). The result is that the total division can not move at one time.

The current fleet of vehicles is designed to transport either liquids, primarily fuel, or dry cargo. This does not allow for their most efficient use. As discussed earlier, the rates of consumption of fuel and ammunition are directly related to the type of operation--defense or offense. In relative terms, as one goes up the other decreases. Ideally all transport platforms would be able to move either fuel or ammunition, or any other dry cargo, depending on which was the most critical. Such a vehicle, a truck with interchangeable fuel and cargo containers is being considered; it will significantly enhance flexibility if and when available. However, the capability to convert stake and platform trailers to fuel transporters

currently exists. By adding a collapsible 3000 gallon tank they could haul either fuel or cargo. This increased capability requires no increase in vehicles nor personnel yet would improve transportation flexibility.

The actual number of vehicles authorized is not adequate to meet wartime requirements and the transportation units are not manned to gain maximum efficiency from those that are assigned. Revised equipment usage profiles for transportation units indicate that the vehicles will be operated approximately 12 hours a day,⁶⁰ which equates to an average day of 16-18 hours per driver. If drivers were authorized on the basis of more than one per vehicle, vehicles could be operated 20 hours a day and there still would be time to perform required maintenance (this same principle could be effectively applied anywhere operator hours are the constraint). In fact if the normal operations profile were two 12 hour shifts, it is conceivable that the total number of systems could be reduced if the number of operators were increased--and unit output go up. The old H series TOEs authorized one platoon in the TMT company to be manned at more than one driver per vehicle. This allowed that platoon theoretically to double its daily output. If the units had two drivers per vehicle the output would increase correspondingly, without an increase in trucks. During peacetime and manpower constrained periods it is doubtful that the increased authorization can be supported, but it should at least be planned as a wartime augmentation.

Transportation units are not as mobile as the units they support. The M-1 and Bradley family of vehicles have unprecedented cross country mobility. With the exception of some recovery vehicles and the M-113s in the FSB (MST vehicle and ambulances), the combat service support vehicles at all echelons are wheeled with limited cross country mobility and speed. In fact the

division's primary transportation vehicles, HETs, 5,000 gallon tankers and 22 1/2 ton semitrailers have no obstacle crossing capability and for all practical purposes are road bound. Where they can travel off road their speed is significantly reduced, easily less than a third of the combat systems they support.⁶¹ The deployment of the heavy expanded mobility tactical truck (HEMTT) in the maneuver battalions has made a marked improvement at that level, but combat service support vehicles still do not possess the degree of cross country mobility of the combat systems they support. Their lack of mobility will inhibit maneuver force agility. The rate of advance must either be limited to that of the combat service support vehicles, or the combat forces can advance at their increased rate until they run out of fuel or ammunition, then stop and wait for the combat service support elements to catch up and resupply them. Either way the effect will be the same, maneuver force movement will be constrained.

Another characteristic of the transportation fleet affecting maneuver force agility is its total vulnerability to enemy action. Not only are the vehicles limited in speed and canalized to roadways by their lack of cross country mobility, but their thin skin provides no protection. Studies consistently predict loss rates for thin skinned, wheeled refuel and rearm vehicles in the forward areas as great as five or six times that of the close combat vehicles they support. Other studies estimate loss rates to be as high as 91 percent by the end of the second day of combat.⁶² Regardless of the actual rate, there is no question it will be significantly higher than the combat systems. Considering the austere transportation/distribution assets, losses of the predicted magnitude could not be sustained and the maneuver force still be supported. The transportation vehicles must be made more

survivable, and there must be more redundancy. The use of armored tracked resupply vehicles, like the M-113s currently in the FSB, would not only afford more protection but would provide the improved mobility that is essential for combat service support operations forward of the brigade.

Organization For Field Services

"Field services are those logistics support functions required to support an armed force that are not included in supply, maintenance, and transportation functions."⁶³ They consist of graves registration (GRREG), airdrop, clothing exchange and bath (CEB), laundry and reimpregnation, bread baking, light textile and clothing renovation, and salvage. Only graves registration and airdrop are considered as essential to the support of combat operations. In peacetime all field service functions are consolidated in COSCOM units, with the MSB's S&S Company having GRREG and CEB cadre positions⁶⁴ to conduct training. Doctrinally, wartime augmentations provide the platoons and sections necessary for the S&S Company to perform GRREG, CEB, and salvage. However, there are not enough of these units in the force structure to fill the augmentation requirements. Additionally, since the functions are not essential to combat operations, it would improve the division's agility if they remained at corps during wartime, and were made available when the tactical situation permitted.

The one service which has the potential to hinder agility is GRREG. Recovery of the dead is a unit responsibility. It has been added as a common soldier's task and to unit ARTEPs; and it has always been a tenet of faith that the Army will properly care for its dead. Doctrinal publications have

recently reached the field, but few units have thought through, developed and exercised wartime procedures. If the battlefield is correctly envisioned, there will be significant numbers of killed, both friendly and enemy, and the nonlinear nature of engagements will inhibit systematic collection by follow on support forces as was done during WWII. Therefore, maneuver forces probably will be required to collect and carry their killed with them until they can be evacuated--the impact of which has not been thought through and for which adequate doctrine has not been developed.

Summary

The fundamental characteristics required of a maneuver force by AirLand Battle doctrine were developed earlier. The tenets of synchronization, depth, initiative, and agility capture the requirements for the force as a whole, and the imperatives of anticipation, integration, continuity, responsiveness, and improvisation the attributes necessary in the sustainment system. As shown in the previous sections, the current sustainment system appears to conform doctrinally and conceptually to these characteristics. In fact it exceeds peacetime requirements, and based on the LOGEN data, meets the wartime demands. However, upon examination there are numerous limitations within the system that will prevent it from meeting the challenge of supporting forces on the AirLand battlefield. Some of these are created by peacetime constraints, some are recognized and doctrinally accommodated, and others are caused by the prevailing support concepts.

The present organization of combat service support elements at each level from company through corps, while it conceptually should foster robust self sufficient, agile units, in reality does not. Because, at no echelon within the division are these elements actually self sufficient. They all require external assets to perform critical functions. Maintenance teams are 'pushed down' by each echelon, medical evacuation is performed on the principle of supporter to supported, and inadequate transportation assets are consolidated at battalion and division. Ammunition supply comes from corps directly to the consuming unit with no reserve stockage in between. In fact, services, maintenance, and transportation requirements are doctrinally recognized as exceeding the division's capabilities, with the shortfall to be made up by corps assets supporting forward in the division area--employing fix/position forward or throughput concepts. Concepts which in theory should enhance agility by adding flexibility, depth and redundancy, in fact only offset shortages in capabilities at lower echelons. In execution they require conditions such as timely and reliable communications, predictable requirements, and freedom of movement that probably will not exist on the Airland battlefield.

The maintenance system is structured to maximize support to 'pure' units. The teams at each level are organized and equipped to maintain a specific size and type unit (tank company, mech battalion) and system (M-1, Bradley). However, the maneuver force rarely fights pure, and the maintenance teams do not have sufficient capability to support 'their units' adequately at multiple locations when the units are broken up and task organized into combined arms teams. This problem is not unique to the sustainment system.

Combat service support vehicles are not designed to be as mobile or survivable as the close combat systems they support. Their limited speed and cross country mobility determines the overall rate of advance for the maneuver force. Movement can be at their reduced rate or the maneuver force can advance at its increased speed until resupply is required, then stop and wait for the combat service support elements to catch up--as happened to Patton's third Army in France. Either way, maneuver force agility is constrained. Additionally, studies have demonstrated that the unprotected, thin skinned wheeled resupply vehicles will suffer significantly higher loss rates than the combat system they support. This will degrade the already austere support below the level necessary to sustain the maneuver force. While these have long term materiel acquisition implications, use of armored support vehicles (like the FSB use of M-113s as ambulances and MST vehicles) would attack both problems.

Most of the combat service support units are not organized to be as mobile as the forces they support. They require external transportation assistance or multiple lifts to move their organic TOE equipment and any on hand supplies, patients, or damaged customer equipment. All of these demands further increase the requirement for external transportation and lengthen the relocation time. The organization of the division's TMT company with less than one tractor per semitrailer and the S&S company's nonmobile FSSP to store bulk fuel are examples of the organizationally designed mobility constraints. Further complicating agility is the Army wide shortage of authorized transportation assets such as 5,000 gallon tankers and HETs.

The unique peacetime systems for ammunition, fuel, medical, and services support will make transition to war difficult. Additionally, the inability to create sufficient demands in peacetime to exercise these wartime systems adequately, and the fact that most of the corps combat service support units are in the reserve components, all contribute to the inability to 'train as we will fight.' This in turn prevents testing/modification of the system and the development of habitual associations, standard techniques, procedures, and commonly shared views. FM 63-3 describes each of these conditions as essential to success--"combat service support units must train in situations that simulate the modern battlefield as closely as possible in terms of environment, tempo, dimensions of time and space, stressing teamwork, flexibility, and initiative."⁶⁵ What are the implications of these limitations on the doctrine?

Implications

AirLand Battle is the U.S. Army's doctrine for fighting the next mid to high intensity conflict. To be successful the doctrine requires a homogeneous combined arms force specifically organized, equipped, and trained to execute its maneuver style of warfare. Each component, combat, combat support, and combat service support must be an equal contributor to total force balance and homogeneity. If all are not in relative balance, the least capable will determine total force capability--much like the weak link in a chain. As we have seen, the sustainment system fails in many aspects to meet the requirements of the doctrine and in fact maybe out of balance with the combat force. While this paper's limited analysis of only the combat service support

system is not adequate to reach definitive conclusions, it very possibly could point to the sustainment system as the center of gravity for AirLand Battle doctrine--the element that if attacked by the enemy could unhinge the entire force,--a proposition that warrants a total system review and if true, clearly must be corrected.

Some of the differences between doctrinal requirements and current capabilities are unique to a specific logistics functional area like the non standard medical supply system, transportation units organized with more trailers than tractors, and the maintenance system structured to support 'pure' units but they can not be viewed in isolation. No longer can we 'fix' one problem without examining how it affects the total system. Most of the differences however, cut across multi-functions, further indicating the need for an integrated total sustainment system review. Indications of systematic problems include:

- o Support concepts, throughput, support forward, et al, were developed prior to AirLand Battle doctrine and appear to be more appropriate to a linear battlefield focused on vertical support along relatively lengthy, secure LOCs and support bases.

- o Combat service support elements are at all levels but none are self-sufficient--requiring a continuous flow from corps of assets in and out of the division.

- o DOPS are vastly different for each class of supply, causing assets to be dedicated to maintaining non-essential items while some combat critical supplies are constantly in short supply.

- o None of the support units are as mobile as the units they support.

- o Support equipment has focused on efficiency in performing a single functional mission to the detriment of flexibility, mobility and survivability.

- o Decentralized operations and management by functional area, and the lack of automation and adequate communications prevents the centralized 'management', command and control necessary to agilely adjust the sustainment system to respond to changing battlefield conditions.

This list is not intended to be all inclusive, rather indicative of the need to develop a balanced sustainment system, one balanced among the various logistics functions and within the total combined arms force and capable of executing the doctrine.

The most serious problem facing the sustainment system potentially is the inability to stress it under wartime conditions. The above discontinuities between doctrine and current capabilities presuppose that we have the requirements 'nearly right' and only must mold the system to conform to them. However, without the ability to test, confirm or revise the requirements based on actual experience, they can not be confirmed. A mistake here could necessitate fundamental changes in support doctrine and force structure, changes for which there will not be enough time on the next battlefield.

As we have seen, four of the five logistical functional areas--supply, medical, transportation, and services--all have significant constraints on their ability to exercise wartime procedures. So the challenge is to replicate the wartime system as closely as possible and develop procedures to minimize turbulence in transitioning to wartime systems. Some of the constraints like legal and safety requirements must be accepted and lived

with, but others do not. Basic requirements data like consumption, failure, loss, expenditure, and casualty rates that drive capabilities (personnel, equipment, and organizations) must be revised to reflect current equipment, support and operational concepts. Increased use of new modeling techniques that accurately represent the dynamics of maneuver versus attrition style of war is needed. The doctrine must be tested by units that will be required to execute it. Command post and field training exercises must foster the development of common practices and procedures and test the doctrine against current capabilities with an eye to identifying and developing solutions to disconnects and doctrinal voids. Periodic large unit, at least corps, including reserve component organizations must be held to exercise the entire system. The lessons learned must be fed back so that required changes and revisions can be made--resulting in a 'living doctrine' that drives technology and force structure, and maintains the balance in the total force necessary to execute the doctrine.

In the final analysis, this paper seeks to increase awareness and encourage critical thought about the current doctrine and sustainment system. Logisticians, tactical, and operational maneuver force commanders collectively must recognize the limitations it poses to the execution of AirLand Battle doctrine--only then can we get on with making it executable.

END NOTES

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- 6 FM 100-5, Operations, p. 2-10.
- 7 Ibid., p. 2-11.
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- 9 Ibid., p. 4-1.
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- 16 Hanson W. Baldwin, Tiger Jack, (Ft. Collins, CO: The Old Army Press, 1979), pp. 156-158, and 4th Armored Division, "After Action Report" The Establishment and Defense of the Nancy Bridgehead," 1945, copy in CARL.
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- 18 Ibid., p. 4-5.
- 19 U.S. Army Logistics Center, Logistics Planning Factors - Special Computer Run (Fort Lee, VA., March 1986), NPN. The following is an explanation of the logic for the requirements and capabilities comparison. Class I is normally delivered by corps to the division's MSB where it is broken down into brigade size lots and moved by the TMT company's vehicles to the FSBs where it is broken and issued to maneuver battalions. Daily capacity for the MSB's S&S

company is 39.2 ST, each FSB supply company can handle 9.75 ST, for a division total of 68.5 ST. The requirement of 60.2 ST is within the division's total capability, but it exceeds the S&S company's capacity by 21 ST. This quantity must be throughput from corps to the FSBs. Classes II, III (package), IV, and VII are normally combined into a single operation, and their capability can be consolidated to satisfy the total requirement. The capabilities totaling 199.9 ST are adequate to handle the combined requirements of 153.1 ST. Class III (bulk), best case would consider use of the entire FSSP (with 120,000 gallons of fuel in storage, and also use it as a supply point for units in the DSA) and 75% of all tankers (making two round trips a day distributing 450,800 gallons of fuel) for a total capacity of 570,800 gallons. This would meet the requirement of 471,900 gallons, only if 21,100 gallons were issued from the FSSP directly to unit refuel vehicles. There would still be approximately 99,000 gallons in the FSSP but the tankers would have exhausted their capability to distribute it. This would give the division 1.2 days of fuel on hand. The more realistic situation uses half of the FSSP and the other half would be in some stage of relocating. Half of the tankers would be available. Giving a total capacity of 60,000 gallons in storage and the ability to distribute 350,000 gallons or a total of 410,000 gallons--61,900 gallons short of the requirement. Corps tankers would have to throughput to the FSBs and unit refuelers would have to return to the DSA to receive fuel from the supply point. This would give the division. 9 days of fuel on hand. ATP capacity was assumed to be 80 percent of its rated capacity. This considers CSR, shortage of trailers, etc. and results in a throughput in the MSB of 280 ST and 240 in each FSB or a total of 1000 ST, which is 1908 ST less than the daily requirement. Maneuver battalions must go to the ASP/CSA and pickup this quantity using their organic transportation. Assuming four round trips a day for the vehicles drawing ammunition at the ATPs and two round trips for those going to the ASP/CSA there is adequate authorized transportation assets to support the requirement. Medical resupply is not given a rated capacity in short tons, but it can be accomplished by ambulances evacuating patients backhauling the supplies. The daily tonnage requirements are easily within the capabilities of the ambulances to support. Class IX capability is normally rated in number of lines and not ST. Daily gross tonnage requirements for repair parts presents no problem being supported. The capability of the maintenance companies to receive, process and distribute easily exceeds the requirement. Repair of individual weapons systems will be limited by the shortage or timely availability of specific components, parts or major assemblies. In summary, based on the LOGCEN computer generated daily requirements, the CSS system has the capability to provide sustained support to the division given certain constraints. The COSCOM must throughput class I and III (bulk) to the FSBs; the maneuver battalions must go to the ASP/CSA to pick up most of their ammunition; and the resources must adjust to where the requirements are (consolidate like functions to gain economy of scale--class II, III (pkg), IV and VII into a single operation). All of these are accommodated in current support concepts.

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- 29 U.S. Army Field Manual 63-3J, Combat Service Support Operation - Corps (August 1985), p. 5-1.
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- 31 FM 63-2-2, Combat Service Support: Division, pp. 5-9, 5-10.
- 32 Ibid.
- 33 Ibid.
- 34 Ibid.
- 35 U.S. Army, Field Manual 10-69, Petroleum Supply Point Equipment and Operations (1982), pp. 12-1 through 12-4.
- 36 FM 100-10, Combat Service Support, p. 5-7.
- 37 FM 63-2-2, Combat Service Support: Division, p. 5-12.
- 38 FM 100-10, Combat Service Support, p. 5-11.
- 39 Ibid., p. 5-10.
- 40 Basis of the number of semitrailers is the rated daily capacity of the MSB's and PSB's ATPs, divided by trailer capacity. This assumes that the trailers will be loaded to maximum tonnage, which probably will not be true, as some will cube out before they reach maximum weight. The numbers accordingly reflect best case (least number of trailers).

- 41 FM 100-10, Combat Service Support, p. 5-18.
- 42 Ibid., pp. 5-18 through 5-20 and FM 63-2-2, Combat Service Support: Division, pp. 5-22, 5-23.
- 43 Ibid.
- 44 Ibid.
- 45 There is no reserve stockage of ammunition, only a basic load that provides "enough ammunition to sustain combat until resupply can be effected." The fuel DOFS is based on a best case where the entire FSSP (120,000 gallons) and 75% of all MSB and FSB tankers (450,800 gallons); and a more realistic case where half of the FSSP (60,000 gallons) and 50% of all the tankers are used. Consumption is based on the LOGCEN computer generated data. The best case provides 1.2 DOFS while the more realistic case equals .9 DOFS. Repair parts DOFS is based on the economic order model used by the DMMC.
- 46 FM 63-2-2, Combat Service Support: Division, p. 6-1.
- 47 Ibid., p. 6-2.
- 48 U.S. Army Ordnance Center, Restructure of the Nondivisional Maintenance Company (TOE 29-209H) (Aberdeen Proving Ground, MD. 8 November 1985), pp. 1-3.
- 49 FM 63-2-2, Combat Service Support: Division, pp. 6-8 through 6-16.
- 50 Ibid., pp. 6-12, 6-15.
- 51 FM 63-20, Forward Support Battalion, pp. 6-1 through 6-9, and FM 63-2-2 Combat Service Support: Division, pp. 6-4 through 6-6.
- 52 FM 63-2-2, Combat Service Support: Division, p. 6-5.
- 53 Ibid., pp. 10-2, 10-3.
- 54 U.S. Army Field Manual 63-21, Main Support Battalion (Final Draft 1986), pp. 10-1 through 10-3.
- 55 Ibid., pp. 10-2 through 10-5.
- 56 FM 63-2-2, Combat Service Support: Division, pp. 5-21, 10-5.
- 57 FM 100-10, Combat Service Support, p. 8-2.
- 58 FM 63-2-2, Combat Service Support: Division, pp. 7-3 through 7-5.
- 59
- 60 U.S. Army Logistic's Center, Logistic's Planning Factors-Special Computer Run (Fort Lee, VA. March 1986), NPN.

- 61 Special Text, U.S. Army Family of Equipment, (Aberdeen Proving Ground, undated) section I and VIII.
- 62 Green, Michael R., "Refueling, Repairing, Rearming," Army (Arlington, VA., February 1986) p. 57.
- 63 FM 63-2-2, Combat Service Support: Division, p. 8-1.
- 64 FM 100-10, Combat Service Support, pp. 9-2 through 9-5.
- 65 FM 63-3, Combat Service Support-Corps, p. 1-9.

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